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NATIONAL DAM INSPECTION PROGRAM. JENNINGS POND DAM (NDI I.D. PA--ETC(U)
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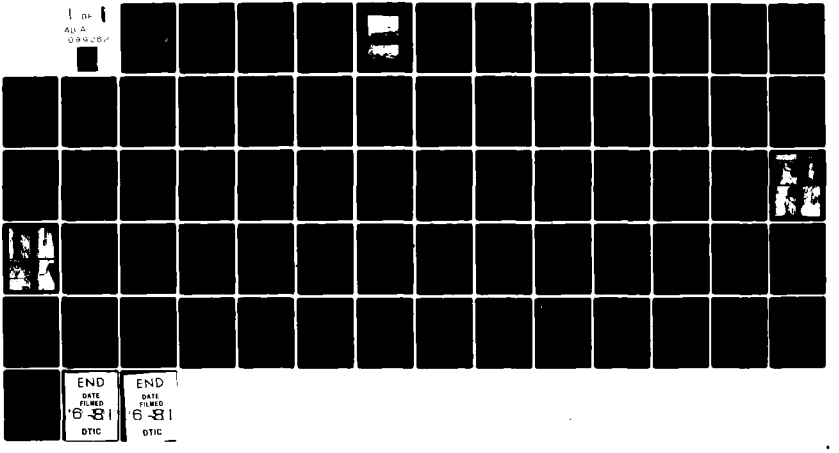

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SUSQUEHANNA RIVER BASIN
LITTLE MEHOOPANY CREEK, WYOMING COUNTY

PENNSYLVANIA

(6) National Dam Inspection Program.

JENNINGS POND DAM

(NDI I.D. PA-0891
DER I.D. 066-012)

~~OWNER: MR. R. JENNINGS~~ Susquehanna River Basin, Little Mehoopany Creek, Wyoming County, Pennsylvania.

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

(10) Lawrence D. Anderson

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PREPARED FOR

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS
BALTIMORE, MARYLAND 21203

BY

D'APPOLONIA CONSULTING ENGINEERS
10 DUFF ROAD
PITTSBURGH, PA. 15235

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PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Department of the Army, Office of Chief of Engineers, Washington, D.C. 20314.

The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon visual observations and review of available data. Detailed investigations and analyses involving topographic mapping, subsurface investigations, material testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the inspection is intended to identify any need for such studies which should be performed by the owner.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of the dam depends on numerous and constantly changing internal and external factors which are evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

The assessment of the conditions and recommendations was made by the consulting engineer in accordance with generally and currently accepted engineering principles and practices.

PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM

NAME OF DAM: Jennings Pond Dam
STATE LOCATED: Pennsylvania
COUNTY LOCATED: Wyoming
STREAM: Little Mehoopany Creek, tributary of Susquehanna River
SIZE CLASSIFICATION: Small
HAZARD CLASSIFICATION: Significant
OWNER: Mr. Robert Jennings
DATE OF INSPECTION: November 11, 1980 and February 4, 1981

ASSESSMENT: Based on the evaluation of the existing conditions, the condition of Jennings Pond Dam is considered to be fair. The dam is a dry masonry structure backed by an earth fill on the upstream side. Although the conditions observed are not significantly affecting the overall performance of the dam at this time, the apparent downstream creeping of the dam suggests that the continued stability of the dam is questionable. Further, due to the lack of erosion protection at the abutment and downstream of the nonoverflow sections, significant overtopping of the nonoverflow sections may result in major damage to the dam. Further evaluation of these concerns by a professional engineer is recommended.

The flood discharge capacity of the dam was evaluated according to the recommended procedure and was found to pass approximately 10 percent of the *Probable Maximum Flood* (PMF) without overtopping the nonoverflow sections of the dam. This capacity is less than the recommended spillway design flood of 50 percent of the PMF. Therefore, the spillway capacity is classified to be inadequate.

The following recommendations should be implemented immediately or on a continuing basis.

1. The owner should immediately investigate the structural condition of the dam and determine the nature and extent of improvements required to improve the structural stability of the dam and to provide adequate flood discharge capacity.

2. In conjunction with further evaluation of the dam, the structural and operational condition of the outlet works should be evaluated and necessary maintenance performed. Also, the need for erosion protection below the nonoverflow section should be evaluated.

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Justification
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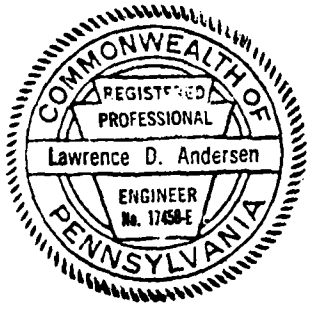
3. Around-the-clock surveillance should be provided during unusually heavy runoff and a formal warning system developed to alert the downstream residents in the event of emergencies.

4. The owner should develop a formal operating and maintenance plan and inspect the dam regularly and perform necessary maintenance.



Lawrence D. Andersen, P.E.
Vice President

March 19, 1981
Date

Approved by:

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

22 APR 81
Date

JENNINGS POND DAM
NDI I.D. PA-0891
DER I.D. 066-012
NOVEMBER 11, 1980

Looking Downstream

Looking Upstream

Overview

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(Continued)

PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM
JENNINGS POND DAM
NDI I.D. PA-0891
DER I.D. 066-012

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority. The inspection was performed pursuant to the authority granted by The National Dam Inspection Act, Public Law 92-367, to the Secretary of the Army, through the Corps of Engineers, to conduct inspections of dams throughout the United States.

b. Purpose. The purpose of this inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project

a. Dam and Appurtenances. Jennings Pond Dam consists of a dry masonry wall approximately 170 feet long with a maximum height of 11 feet above the downstream toe of the dam and a crest width of about 5 feet. Against the upstream side of the wall, an earth fill has been placed to a level approximately one foot below the spillway crest. Available records indicate that in 1941 a concrete cutoff wall varying in thickness from 12 inches to 2 feet was placed against the upstream face of the wall, and the overflow section was capped with a concrete slab. Flood discharge facilities for the dam consist of a 61-foot-wide overflow section of the dam, about 2.5 feet below the crest of the nonoverflow section. Discharges over this section flow into a plunge pool at the toe of the dam and downstream into the stream channel. The outlet appears to be a 22-inch-diameter cast-in-place concrete conduit controlled by a gate on the upstream end. The gate appears to be manually operated by a stem supported by a steel structure extending above the reservoir water level. This outlet system is the emergency drawdown facility for the dam.

b. Location. Jennings Pond Dam is located (N41° 34.7', W76° 07.6') on Little Mehoopany Creek, one mile east of the town of Jenningsville in Windham Township, Wyoming County, Pennsylvania. Plate 1 illustrates the location of the dam.

c. Size Classification. Small (based on 11-foot height and 247 acre-feet storage capacity at maximum pool).

d. Hazard Classification. The dam is classified to be in the significant hazard category. Downstream from the dam, Little Mehoopany

Creek flows four miles to the confluence with the Susquehanna River. There are four houses in a three-mile reach below the dam which could be affected in the event of a dam failure. It is estimated that failure of Jennings Pond Dam would cause loss of a few lives and property damage in this area.

e. Ownership. Mr. Robert Jennings, R.D.#1, Box 209, Laceyville, Pennsylvania 18623.

f. Purpose of Dam. Recreation.

g. Design and Construction History. No information is available on design and construction of the dam. The owner indicated that the dam was built prior to 1900. The dam was first inspected by the Commonwealth of Pennsylvania in 1919.

h. Normal Operating Procedure. The reservoir is normally maintained at Elevation 1009, the crest level of the spillway. Inflow occurring when the lake is at or above the spillway crest level is discharged through the uncontrolled spillway.

1.3 Pertinent Data. Elevations referred to in this and subsequent sections of the report were calculated based on field measurements assuming the spillway crest to be at Elevation 1009, which is shown to be the normal pool elevation on the USGS 7.5-minute Jenningsville quadrangle.

a. Drainage Area	7.9 square miles[1]
b. Discharge at Dam Site (cfs)	
Maximum known flood at dam site	Unknown
Outlet conduit at maximum pool	Unknown
Gated spillway capacity at maximum pool	Not applicable
Ungated spillway capacity at maximum pool	700
Total spillway capacity at maximum pool	700
c. Elevation (USGS Datum) (feet)	
Top of dam	1011.4 (low spot on crest)
Maximum pool	1011.4
Normal pool	1009.0
Upstream invert outlet works	Unknown
Downstream invert outlet works	1000.8
Maximum tailwater	Unknown
Toe of dam	1001±

[1] Planimetered from USGS topographic maps.

d. Reservoir Length (feet)

Normal pool level	2600
Maximum pool level	3000±

e. Storage (acre-feet)

Normal pool level	147
Maximum pool level	247

f. Reservoir Surface (acres)

Normal pool level	36.7
Maximum pool level	46.9

g. Dam

Type	Dry masonry wall
Length	169 feet
Height	11 feet
Top width	3 to 7 feet
Side slopes	Downstream: Vertical Upstream: Slope of upstream rock fill is unknown
Cutoff	Concrete wall
Grout curtain	Unknown

h. Regulating Outlet

Type	22-inch pipe
Length	50± feet
Closure	Upstream sluice gate
Access	Not accessible
Regulating facilities	Sluice gate

i. Spillway

Type	Broad-crested concrete-capped masonry overflow section
Length	61 feet
Crest elevation	1009.0 feet
Upstream channel	Lake
Downstream channel	Earth channel

SECTION 2
DESIGN DATA

2.1 Design

a. Data Available. The available data consists of files provided by the Commonwealth of Pennsylvania, Department of Environmental Resources (PennDER) which contain correspondence and inspection reports.

(1) Hydrology and Hydraulics. No design information is available.

(2) Dam. Available information consists of past inspection reports and correspondence.

(3) Appurtenant Structures. No design information is available.

b. Design Features

(1) Dam. No information is available on the design of the dam. Based on field observations, the dam is a dry masonry wall with rock fill on the upstream side. The wall is approximately 170 feet long with a maximum height of 11 feet above the downstream toe and a crest width of about 5 feet. The overflow section of the dam is capped by a concrete slab. The upstream face and top of the stone wall is plastered with concrete.

(2) Appurtenant Structures. The appurtenant structures consist of a spillway and the outlet works. The spillway is a concrete-capped masonry overflow section at the center of the dam with a length of 61 feet. A 2.5-foot freeboard exists between the overflow and nonoverflow sections.

The outlet works appear to consist of a 22-inch-diameter cast-in-place concrete conduit controlled by a gate on the upstream end. A stem supported by a steel structure is used to manually operate the gate. The pipe extends through the wall near the foundation and discharges into the spillway plunge pool at the toe of the dam.

c. Design Data

(1) Hydrology and Hydraulics. No design data are available.

(2) Embankment. No engineering data are available on the design of the embankment.

(3) Appurtenant Structures. No design information is available on the appurtenant structures.

2.2 Construction. No information is available on construction of the dam. Available records indicate that in 1941, the concrete slab and cutoff wall described in Section 1.2 a were constructed and in 1973, some rock fill was added to the upstream earth fill.

2.3 Operation. It is reported that no formal operating records are maintained for the dam.

2.4 Other Investigations. None.

2.5 Evaluation

a. Availability. The available information was provided by PennDER.

b. Adequacy. No design and construction information is available to assess the adequacy of the design of the dam and the appurtenant structures.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. General. The onsite inspection of Jennings Pond Dam consisted of:

1. Visual inspection of the embankment, abutments, and embankment toe.

2. Visual examination of the spillway and the visible portions of the outlet works.

3. Evaluation of the downstream area hazard potential.

The specific observations are illustrated in Plate 2 and in the photographs in Appendix C.

b. Dam. The general inspection of the dam consisted of searching for indications of structural distress, such as cracks, subsidence, bulging, and seeps, and observing general maintenance conditions, erosion, and other surficial features.

In general, the condition of the dam is considered to be fair. Some of the stones in the dry masonry wall were found to be loose and the horizontal alignment of the left and right nonoverflow sections was irregular. The center portion of the dam appears to bow downstream suggesting that the center of the dam is creeping downstream relative to the abutments.

The crest of the dam was surveyed relative to the spillway crest elevation and it was found to be relatively uniform. The crest profile is illustrated in Plate 3.

c. Appurtenant Structures. The spillway structure was examined for deterioration or other signs of distress that would limit flow. In general, the spillway structure, which consists of the overflow section, was found to be in fair condition. The concrete slab on the overflow section, which is reported to have been constructed in 1941, is separated from the left abutment nonoverflow section by approximately eight inches, which may have been caused by downstream bowing of the dam. This observation suggests that, as noted above, the dam may be creeping downstream relative to the abutments.

The only visible portion of the outlet works was the downstream opening of the outlet pipe and the gate stem and the supporting structure. No other portion of the facility was visible and operation of the outlet works was not observed.

d. Reservoir Area. Three dams are located upstream of Jennings Pond Dam. Chamberlain Pond Dam (NDI I.D. PA-0890), which impounds a reservoir with a surface area of 49 acres, is the first dam upstream. Directly upstream of Chamberlain Pond is Negro Pond Dam (NDI I.D. PA-0889), which impounds a reservoir with a surface area of 81 acres.

Upstream of Negro Pond is Sharpe's Pond Dam (NDI I.D. PA-0888), which impounds a reservoir with a surface area of 45 acres at normal pool level.

A map review indicates that the watershed is predominantly covered by woodlands. A review of the regional geology is included in Appendix F.

e. Downstream Channel. Downstream from the dam, Little Mehoopany Creek flows for a distance of four miles to the confluence with the Susquehanna River. A further description of the downstream conditions is included in Section 1.2 d.

3.2 Evaluation. The condition of the dam is considered to be fair. Horizontal alignment of the dam suggests that the central portion of the dam may be creeping downstream. However, at this time, the dam is not showing signs of significant distress. The operational condition of the outlet gate was not observed. Therefore, it is recommended that the outlet valve should be operated and necessary maintenance performed.

SECTION 4
OPERATIONAL FEATURES

4.1 Procedure. There are no formal operating procedures for the dam. The reservoir is normally maintained at the uncontrolled spillway crest level, with excess inflow discharging through the broad-crested overflow section.

4.2 Maintenance of the Dam. The maintenance of the dam is considered to be fair. The abutments are relatively free of unwanted brush and trees. Deficiencies are discussed in Section 3.

4.3 Maintenance of Operating Facilities. The maintenance condition of the operating facilities could not be determined because only the downstream end of the outlet pipe was visible, and the operation of the outlet valve was not observed.

4.4 Warning System. No formal warning system exists for the dam. Telephone communication facilities are available via residences along the reservoir shoreline, one mile downstream and one mile upstream in the town of Jenningsville.

4.5 Evaluation. The maintenance condition of the dam is considered to be fair, the maintenance of the operating facilities could not be determined. It is recommended that the operational condition of the outlet works be evaluated and necessary maintenance performed.

SECTION 5
HYDRAULICS AND HYDROLOGY

5.1 Evaluation of Features

a. Design Data. Jennings Pond Dam has a watershed area of 7.9 square miles and impounds a reservoir with a surface area of 36.7 acres at normal pool level. The flood discharge facilities consist of the 61-foot-wide overflow section of the dam. The capacity of the spillway was determined to be 700 cfs, based on the available 2.4-foot freeboard relative to the low spot on the left abutment.

b. Experience Data. As previously stated, Jennings Pond Dam is classified as a small dam in the significant hazard category. Under the recommended criteria for evaluating emergency spillway discharge capacity, such impoundments are required to pass from the 100-year flood to one-half of the PMF. In view of the downstream damage potential, one-half PMF is selected as the spillway design flood.

The PMF inflow hydrograph for the reservoir was determined utilizing the Dam Safety Version of the HEC-1 computer program developed by the Hydrologic Engineering Center of the U.S. Army, Corps of Engineers. Data used for the computer analysis are presented in Appendix D. The inflow hydrograph for one-half PMF was found to have a peak flow of 6835 cfs. Computer input and summary of computer output are also included in Appendix D.

c. Visual Observations. On the date of inspection, no conditions were observed that would indicate the capacity of the spillway would be significantly reduced in the event of a flood. As discussed in Section 3.1 d, there are three dams upstream of this dam. Flood hydrographs for Jennings Pond Dam were developed including the effects of upstream dams. It is estimated that failure of the immediately upstream Chamberlain Pond Dam under normal pool conditions, which impounds a 49-acre reservoir with an estimated storage capacity of 360 acre-feet, would not cause failure of Jennings Pond Dam, which has a surcharge storage capacity of about 100 acre-feet and spillway capacity of about 700 cfs without overtopping of the nonoverflow section.

d. Overtopping Potential. Various percentages of the PMF inflow hydrograph were routed through Jennings Pond Dam, and it was found that it can pass 10 percent of the PMF without overtopping the nonoverflow sections. At 50 percent of PMF, the dam would be overtopped by a depth of 4.3 feet for a duration of 13.4 hours.

e. Spillway Adequacy. Because the dam cannot pass the recommended spillway design flood of 50 percent of the PMF, the flood discharge capacity of the dam is rated to be inadequate.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

(1) Dam. As discussed in Section 3, the field observations did not reveal any signs of distress that would significantly affect the stability of the dam under normal pool conditions. The apparent downstream bow in the dam and the concrete slab on the overflow section that has separated from the nonoverflow section suggests that the middle section of the dam may be creeping downstream. In view of these observations, concern exists as to the continued stability of the dam and further investigation of this condition is considered advisible. It is also considered advisable that adequate erosion protection be placed along the toe of the dam below the nonoverflow section to prevent toe erosion in this area in the event that the nonoverflow section were to be overtopped.

(2) Appurtenant Structures. The structural performance of the spillway appears to be satisfactory. Because the outlet works were not visible, no conclusions were reached as to the structural adequacy of this facility.

b. Design and Construction Data

(1) Dam. Available design and construction information does not provide any quantitative data to aid in the assessment of stability. Although at this time stability of the dam appears to be adequate under normal pool conditions, in view of the concerns noted above, continued stability of the dam is considered to be questionable, requiring further investigation.

(2) Appurtenant Structures. No design and construction data are available for the appurtenant structures.

c. Operating Records. The structural stability of the dam is not considered to be affected by the operational features.

d. Postconstruction Changes. The postconstruction changes are described in Section 1.2 a.

e. Seismic Stability. The dam is located in Seismic Zone 1. Based on visual observations, the static stability of the dam is considered to be adequate under normal pool conditions, but questionable for high pool conditions. Therefore, the seismic stability of the dam should be reevaluated with further investigation of the dam.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS/PROPOSED REMEDIAL MEASURES

7.1 Dam Assessment

a. Assessment. The visual observations indicate that Jennings Pond Dam is in fair condition. The center portion of the dam appears to bow downstream. A gap exists between the left end of the concrete slab on the overflow section and the adjacent face of the nonoverflow section. These observations suggest that the center of the dam may be creeping downstream. Although the conditions observed are not significantly affecting the performance of the dam at this time, the apparent downstream creeping of the dam suggests that continued stability of the dam is questionable. Further, due to the lack of erosion protection at the abutment and downstream of the nonoverflow sections, significant overtopping of the nonoverflow sections may result in major damage to the dam. Therefore, the stability of the dam under high pool conditions also is considered to be questionable. Further evaluation of these concerns by a professional engineer is recommended.

The operational and structural condition of the outlet works could not be assessed. It is, therefore, recommended that the operational condition of this facility be evaluated and necessary maintenance performed.

Spillway capacity was evaluated according to the recommended procedure and it was found to pass 10 percent of the PMF without overtopping the nonoverflow sections of the dam. This capacity is less than the recommended spillway capacity of one-half PMF according to the size and hazard classification for this dam. Therefore, the spillway is classified to be inadequate.

b. Adequacy of Information. The available information, in conjunction with the visual observations, is considered sufficient to make a Phase I evaluation.

c. Urgency. The following recommendations should be implemented immediately or on a continuing basis.

d. Necessity for Additional Data. In view of the inadequate flood discharge capacity, the owner should immediately initiate additional studies to more accurately ascertain the spillway capacity and the extent of improvements required to provide adequate discharge capacity.

7.2 Recommendations/Remedial Measures

It is recommended that:

1. The owner should immediately investigate the structural condition of the dam and determine the nature and extent

of improvements required to improve the structural stability of the dam and to provide adequate flood discharge capacity.

2. In conjunction with further evaluation of the dam, the structural and operational condition of the outlet works should be evaluated and necessary maintenance performed. Also, the need for erosion protection below the nonoverflow section should be evaluated.

3. Around-the-clock surveillance should be provided during unusually heavy runoff and a formal warning system developed to alert the downstream residents in the event of emergencies.

4. The owner should develop a formal operating and maintenance plan and inspect the dam regularly and perform necessary maintenance.

APPENDIX A

CHECKLIST
VISUAL INSPECTION
PHASE I

APPENDIX A

CHECKLIST
VISUAL INSPECTION
PHASE I

DER: 066-012

NAME OF DAM Jennings Pond COUNTY Wyoming STATE Pennsylvania ID# NDI: PA-0891

TYPE OF DAM Dry Masonry Wall HAZARD CATEGORY Significant

DATE(S) INSPECTION November 11, 1980 WEATHER Cloudy TEMPERATURE 30's

POOL ELEVATION AT TIME OF INSPECTION 1009 M.S.L. TAILWATER AT TIME OF INSPECTION 1001+ M.S.L.

INSPECTION PERSONNEL:	REVIEW INSPECTION PERSONNEL: (February 4, 1981)
Douglas Cosler	Lawrence D. Andersen
Arthur Smith	James H. Poellot
Bilgin Erel	Bilgin Erel

Owner's Representative:
Mr. Robert Jennings

Bilgin Erel RECORDER

VISUAL INSPECTION
PHASE I
CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	Downstream face of the dam is wet (no measurable seepage).	
STRUCTURE TO ABUTMENT/EMBANKMENT JUNCTIONS	No visual signs of distress. No seepage.	
DRAINS	None found.	
WATER PASSAGES	None	
FOUNDATION	No perceivable sign of distress.	

VISUAL INSPECTION
PHASE I
CONCRETE/MASONRY DAMS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS CONCRETE SURFACES	An eight-inch gap exists between the left end of the slab on the spillway section and the face of the nonoverflow section.	
STRUCTURAL CRACKING	None significant.	
VERTICAL AND HORIZONTAL ALIGNMENT	The dam appears to be bowing downstream. See Plate 3 for dam vertical crest profile.	Further investigation of this condition is recommended.
MONOLITH JOINTS	Masonry dam, N/A.	
CONSTRUCTION JOINTS	(No construction joints.)	
STAFF GAGE OF RECORDER:	None found.	

VISUAL INSPECTION
PHASE I
OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	22-inch (I.D.) cast-in-place concrete pipe. Only the downstream end is visible.	
INTAKE STRUCTURE	Submerged, not visible.	
OUTLET STRUCTURE	None	
OUTLET CHANNEL	None. Pipe would discharge to spillway plunge pool.	
EMERGENCY GATE	According to the owner, flow through the outlet pipe is controlled by an upstream sluice gate. Only the stem of the gate was visible. Last operated in 1927.	Operational condition of the outlet pipe sluice gate should be evaluated, and necessary maintenance performed.

VISUAL INSPECTION
PHASE 1
UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	A low section on the crest of the dam. Broad-crested concrete overflow section in fair condition.	
APPROACH CHANNEL	Lake	
DISCHARGE CHANNEL	Plunge pool along the toe of the dam. Riprap is poor at locations.	Plunge pool should be provided with additional riprap.
BRIDGE AND PIERS	None	

VISUAL INSPECTION
PHASE I
GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	(The dam has no gated spillway.)	
APPROACH CHANNEL	N/A	
DISCHARGE CHANNEL	N/A	
BRIDGE PIERS	N/A	
GATES AND OPERATION EQUIPMENT	N/A	

VISUAL INSPECTION
PHASE I
GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	(The dam has no gated spillway.)	
APPROACH CHANNEL	N/A	
DISCHARGE CHANNEL	N/A	
BRIDGE PIERS	N/A	
GATES AND OPERATION EQUIPMENT	N/A	

VISUAL INSPECTION
PHASE I
INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None	
OBSERVATION WELLS	None	
WEIRS	None	
PIEZOMETERS	None	
OTHER	None	

VISUAL INSPECTION
PHASE I
RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	No problems observed.	
SEDIMENTATION	Unknown	
UPSTREAM RESERVOIRS	There are three upstream reservoirs. See Plate 1 for locations: 1. Chamberlain Pond (DER I.D.: 066-011) 2. Negro Pond (DER I.D.: 066-010) 3. Sharpe's Pond (DER I.D.: 066-009)	

VISUAL INSPECTION
PHASE I
DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	No problems observed.	
SLOPES	No problems observed.	
APPROXIMATE NUMBER OF HOMES AND POPULATION	There are four houses in a three-mile reach below the dam which could be affected in the event of a dam failure. Population is approximately 10 to 15.	

APPENDIX B

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
AND HYDROLOGIC AND HYDRAULIC
PHASE I

APPENDIX B

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Jennings Pond

ID# NDI: PA-0891
PER: 066-012

ITEM	REMARKS
AS-BUILT DRAWINGS	No drawings available.
REGIONAL VICINITY MAP	See Plate 1.
CONSTRUCTION HISTORY	No information available.
TYPICAL SECTIONS OF DAM	See Plate 2 (section defined according to field measurements).
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS	See Plate 2 (information obtained from field measurements).

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

ITEM	REMARKS
RAINFALL/RESERVOIR RECORDS	None reported.
DESIGN REPORTS	No design reports available.
GEOLOGY REPORTS	None available.
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	No computations available.
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None reported.

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

ITEM	REMARKS
POST CONSTRUCTION SURVEYS OF DAM	None available.
BORROW SOURCES	None
MONITORING SYSTEMS	No existing monitoring systems.
MODIFICATIONS	A concrete slab was placed on the crest of the spillway and a concrete cutoff wall was placed against the upstream face.
HIGH POOL RECORDS	No records available.

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

ITEM	REMARKS
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None available.
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	None reported.
MAINTENANCE OPERATION RECORDS	No maintenance records.
SPILLWAY PLAN SECTIONS DETAILS	See Plates 2 and 3 for sections defined according to field measurements.
OPERATING EQUIPMENT PLANS AND DETAILS	None available.

CHECKLIST
ENGINEERING DATA
HYDROLOGIC AND HYDRAULIC

DRAINAGE AREA CHARACTERISTICS: 2.26 square miles (wooded)

ELEVATION, TOP OF NORMAL POOL AND STORAGE CAPACITY: 1009.0 (147 acre-feet)

ELEVATION, TOP OF FLOOD CONTROL POOL AND STORAGE CAPACITY: 1011.4 (247 acre-feet)

ELEVATION, MAXIMUM DESIGN POOL: 1011.4 (design pool unknown)

ELEVATION, TOP OF DAM: 1011.4

SPILLWAY:

a. Elevation 1009.0

b. Type Broad-crested concrete overflow section

c. Width 61 feet (perpendicular to flow)

d. Length 4 feet (crest width)

e. Location Spillover None found

f. Number and Type of Gates None

OUTLET WORKS:

a. Type 22-inch cast-in-place concrete pipe

b. Location Middle of spillway wall

c. Entrance Inverts Unknown

d. Exit Inverts 1000.8

e. Emergency Drawdown Facilities 22-inch blow off pipe

HYDROMETEOROLOGICAL GAGES:

a. Type No gages

b. Location N/A

c. Records None

MAXIMUM NONDAMAGING DISCHARGE: Spillway capacity (700 cfs)

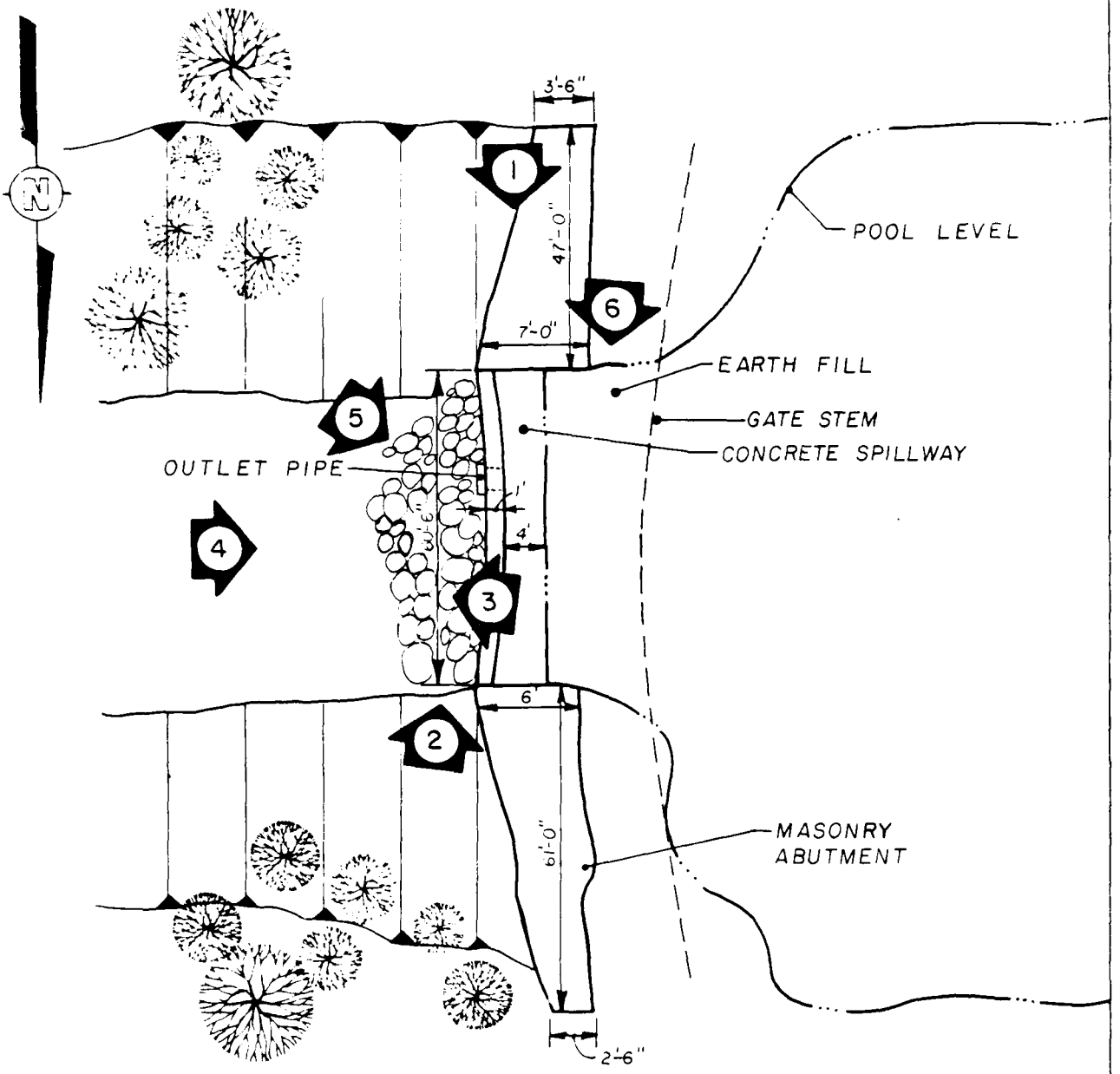
APPENDIX C

PHOTOGRAPHS

LIST OF PHOTOGRAPHS
JENNINGS POND DAM
NDI I.D. NO. PA-0891
NOVEMBER 11, 1980

PHOTOGRAPH NO.	DESCRIPTION
1	Crest (looking north).
2	Dam (looking south).
3	Discharge channel (looking downstream).
4	Dam crest (looking upstream).
5	Outlet pipe (downstream end).
6	Outlet pipe gate stem.
7	House and barn (mile 1.5).
8	House (mile 3.0).

80-5



LEGEND:

2 INDICATES DIRECTION IN WHICH PHOTOGRAPH WAS TAKEN.

JENNINGS POND DAM
KEY PLAN OF PHOTOGRAPHS
FIELD INSPECTION DATE NOV 11,1980

D'APPOLONIA

NOT TO SCALE

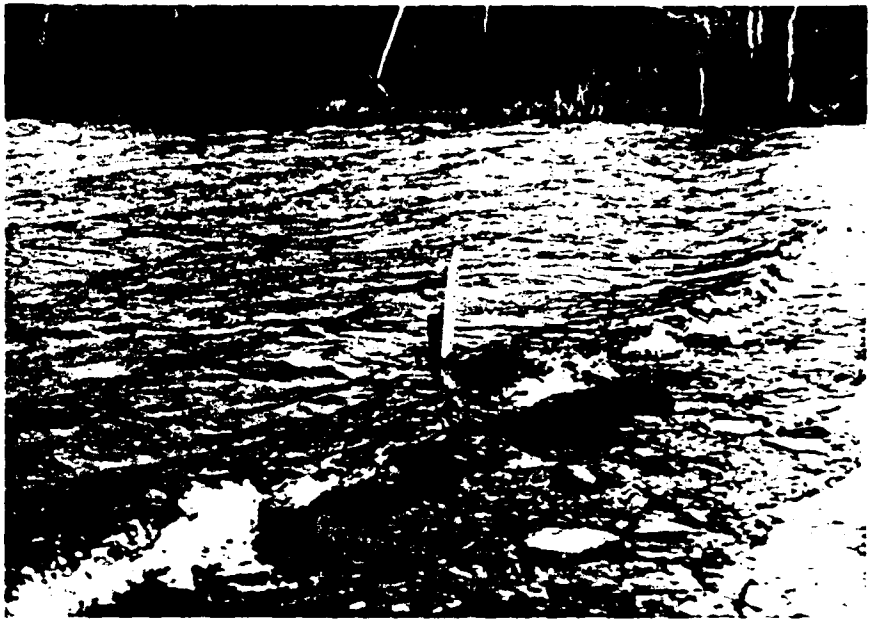
PHOTOGRAPH NO 1

PHOTOGRAPH NO 2

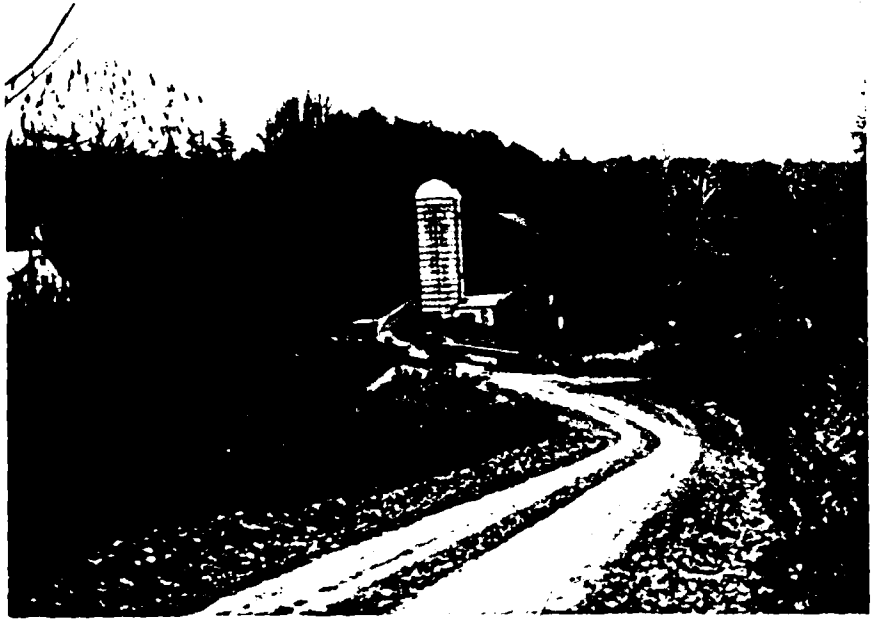
PHOTOGRAPH NO 3

PHOTOGRAPH NO 4

PHOTOGRAPH NO 5



PHOTOGRAPH NO 6



PHOTOGRAPH NO 7

PHOTOGRAPH NO 8

APPENDIX D

HYDROLOGY AND HYDRAULICS ANALYSES

HYDROLOGY AND HYDRAULIC ANALYSIS
DATA BASE

NAME OF DAM: Jennings Pond Dam

PROBABLE MAXIMUM PRECIPITATION (PMP) = 22.2 INCHES/24 HOURS

STATION	1	2	3	4	5
Station Description	Sharpe's Pond Reservoir	Sharpe's Pond Dam	4-Foot-Diameter Road Culvert	Negro Pond Reservoir	Negro Pond Dam
Drainage Area (square miles)	0.99	-	-	3.78	-
Cumulative Drainage Area (square miles)	0.99	0.99	0.99	4.77	4.77
Adjustment of PMF for Drainage Area (%)(1)	97%			97%	
6 Hours	117	-	-	117	-
12 Hours	127	-	-	127	-
24 Hours	136	-	-	136	-
48 Hours	145	-	-	145	-
72 Hours	-	-	-	-	-
Snyder Hydrograph Parameters					
Zone(2)	11	-	-	11	-
C_p/C_t(3)	0.62/1.5	-	-	0.62/1.5	-
L (miles)(4)	1.23	-	-	3.31	-
L_{ca} (miles)(4)	0.44	-	-	0.95	-
$t_p = C_t(L \cdot L_{ca})^{0.3}$ (hours)	1.24	-	-	2.11	-
Spillway Data					
Crest Length (ft)	-	9.4 (perimeter length)	See road culvert capacity calculations	-	Dam has no spillway
Freeboard (ft)	-	1.1		-	
Discharge Coefficient		Varies		-	
Exponent		1.5		-	

(1) Hydrometeorological Report 40, U.S. Weather Bureau, 1965.
(2) Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's Coefficients (C_p and C_t).
(3) Snyder's Coefficients.
(4) L = Length of longest water course from outlet to basin divide.
L_{ca} = Length of water course from outlet to point opposite the centroid of drainage area.

STORAGE VS. ELEVATION

ELEVATION	ΔH, FEET	AREA (acres)(1)	ΔVOLUME (acre-feet)(2)	STORAGE (acre-feet)
1020		83.6		291.5
1009 (Spillway Crest El.)	11	36.7	644.2	147.3
1001(3)	8	5.0	147.3	0

(1) Planimetered from USGS maps.
(2) $\Delta Volume = \Delta H/3 \ (A_1 + A_2 + \sqrt{A_1 A_2})$.
(3) Estimated reservoir bottom elevation.

HYDROLOGY AND HYDRAULIC ANALYSIS
DATA BASE

NAME OF DAM: Jennings Pond Dam (continued)

PROBABLE MAXIMUM PRECIPITATION (PMP) = _____ INCHES/24 HOURS

STATION	1	2	3	4	5
Station Description	Chamberlain Pond Reservoir	Chamberlain Pond Dam	Little Menoco-any Creek	Jennings Pond Reservoir	Jennings Pond Dam
Drainage Area (square miles)	0.90	-	-	2.26	-
Cumulative Drainage Area (square miles)	5.67	5.67	5.67	7.93	7.93
Adjustment of PMF for Drainage Area (%)(1)	97%			97%	
6 Hours	117	-	-	117	-
12 Hours	127	-	-	127	-
24 Hours	136	-	-	136	-
48 Hours	145	-	-	145	-
72 Hours	-	-	-	-	-
Snyder Hydrograph Parameters					
Zone(2)	11	-	-	11	-
C_p/C_t(3)	0.62/1.5	-	-	0.62/1.5	-
L (miles)(4)	1.33	-	-	1.70	-
L_{ca} (miles)(4)	0.47	-	-	0.57	-
$t_p = C_t(L \cdot L_{ca})^{0.3}$ (hours)	1.30	-	-	1.49	-
Spillway Data					
Crest Length (ft)	-	62.0	-	-	61.0
Freeboard (ft)	-	3.7	-	-	2.4
Discharge Coefficient	-	3.08	-	-	3.08
Exponent	-	1.5	-	-	1.5

(1) Hydrometeorological Report 40, U.S. Weather Bureau, 1965.
(2) Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's Coefficients (C_p and C_t).
(3) Snyder's Coefficients.
(4) L = Length of longest water course from outlet to basin divide.
L_{ca} = Length of water course from outlet to point opposite the centroid of drainage area.

STORAGE VS. ELEVATION

ELEVATION	ΔH, FEET	AREA (acres)(1)	ΔVOLUME (acre-feet)(2)	STORAGE (acre-feet)

(1) Planimetered from USGS maps.
(2) $\Delta Volume = \Delta H/3 \ (A_1 + A_2 + \sqrt{A_1 A_2})$.

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**   ****************************
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION      JULY 1978
  LAST MODIFICATION  01 APR 80
****************************
    1                 A1       SNYDER HYDROGRAPH,SPILLWAY, OVERTOPPING, AND DOWNSTREAM CHANNEL ANALYSES
    2                 A2       JENNINGS POND DAM(DER I.D. 66-12)WYOMING COUNTY,PA. PROJECT NO.80-556-04
    3                 A3       FOR 10%,20%,30%,40%,50%,60%,70%,80%,AND 100% PROBABLE MAXIMUM FLOOD(PMF)
    4                 B     300        0       12        0        0        0        0        0       -4        0
    5                 B1      5
    6                 J       1        9        1
    7                 J1   0.10     0.20     0.30     0.40     0.50     0.60     0.70     0.80     1.00
    8                 K       0        1                                                   1
    9                 K1        CALCULATION OF SNYDER INFLOW HYDROGRAPH TO SHARPE'S POND,(DER 66-09)
   10                 M       1        1     0.99             4.77                                      1
   11                 P              21.5      117      127      136      145
   12                 T                                                          1.0      0.5           0.0709
   13                 W    1.24     0.62
   14                 X    -1.5    -0.05      2.0
   15                 K       1        2                                                   1
   16                 K1        ROUTING FLOW THROUGH SHARPE'S POND,(DER 66-09)
   17                 Y                                         1        1
   18                 Y1      1                                                  -1135.0       -1
   19                 Y41135.0  1135.2   1135.4   1135.6   1135.8   1136.0 1136.13   1137.0   1138.0   1138.5
   20                 Y41139.0 1139.54   1140.0   1141.0   1142.0   1143.0
   21                 YS   0.00      2.7      7.6     14.0     21.6     30.2     36.2     48.1     59.0     65.7
   22                 YS   68.1     72.5     73.3     75.0     76.7     78.3
   23                 SA   45.0     56.0     99.2
   24                 SE1135.0  1140.0   1160.0
   25                 SS1135.0
   26                 SD1136.1     2.65      1.5    525.0
   27                 SL  100.0    150.0    200.0    250.0    300.0    350.0    450.0    475.0    515.0    525.0
   28                 SV1136.1  1136.2   1136.5   1136.9   1137.0   1137.1   1137.2   1137.4   1139.2   1141.3
   29                 K       1        3                                                   1
   30                 K1        ROUTING FLOW THROUGH 4 FEET DIAM. CULVERT.  HOMES AT ELEVATION 1105
   31                 Y                                         1        1
   32                 Y1      1                                                  -1100.0       -1
   33                 Y41100.0  1101.0   1102.0   1103.0   1104.0   1105.0   1106.0   1107.0   1108.0   1109.0
   34                 Y41110.0  1112.0   1114.0   1116.0   1118.0   1120.0   1122.0   1124.0
   35                 YS    0.0     10.0     23.0     46.0     72.0     95.0    117.0    132.0    146.0    158.0
   36                 YS  170.0    191.0    210.0    227.0    243.0    259.0    275.0    286.0
   37                 SA    0.9      4.6     18.4
   38                 SE1100.0  1120.0   1140.0
   39                 SS1100.0
   40                 SD1120.0     2.65      1.5    400.0
   41                 K       0        4                                                   1
   42                 K1        CALCULATION OF SNYDER INFLOW HYDROGRAPH TO NEGRO POND,(DER 66-10)
   43                 M       1        1     3.78             4.77                                      1
   44                 P              21.5      117      127      136      145
   45                 T                                                          1.0      0.5           0.0535
   46                 W    2.11     0.62
   47                 X    -1.5    -0.05      2.0
   48                 K       2        4                                                   1
   49                 K1        COMBINED INFLOW HYDROGGRAPH TO NEGRO POND,(DER 66-10)
   50                 K       1        5                                                   1
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51              K1      ROUTING FLOW THROUGH NEGRO POND,(DER 66-10)
52              Y                                       1       1
53              Y1      1                                               -1064.6
54              $A  17.0    80.8    164.4   247.0
55              $E1057.0  1063.6  1080.0  1100.0
56              $$1063.6    0.001     0.01     1.5
57              $D1063.7    2.65      1.5    325.0
58              $L  25.0    40.0    55.0    70.0    85.0    95.0    110.0   125.0   325.0
59              $V1063.7  1064.9  1065.3  1065.5  1066.2  1067.1  1067.8  1068.2  1068.5
60              K       0       6                                       1
61              K1      CALCULATION OF SNYDER INFLOW HYDROGRAPH TO CHAMBERLAIN POND,(DER 66-11)
62              M       1       1       0.9             5.67                                    1
63              P               21.5    117     127     136     145
64              T                                                       1.0     0.5             0.0941
65              W   1.30    0.62
66              X   -1.5    -0.05     2.0
67              K       2       6                                       1
68              K1      COMBINED INFLOW HYDROGRAPH CHAMBERLAIN POND,(DER 66-11)
69              K       1       7                                       1
70              K1      ROUTING FLOW THROUGH CHAMBERLAIN POND,(DER 66-11)
71              Y                                       1       1
72              Y1      1                                               -1055.0
73              $A    8.0    48.7    67.0    104.7
74              $E1041.0  1055.0  1060.0  1080.0
75              $$1055.0    62.0     3.08     1.5
76              $D1058.7     3.08     1.5     83.0
77              $L  22.0    40.0    83.0
78              $V1058.7  1059.1  1064.4
79              K       1       8                                       1
80              K1      CHANNEL ROUTING USING MODIFIED PULS,2200FT.D/S CHAMBERLAIN,JENNINGSVILLE
81              Y                                       1       1
82              Y1      1
83              Y6 0.030    0.040   0.035   1020.0  1039.0  2200.0  0.00941
84              Y7    0.0  1080.0   200.0  1060.0   450.0  1040.0   710.0  1020.0   720.0  1020.0
85              Y7 950.0  1040.0  1100.0  1060.0  1200.0  1080.0
86              K       1       9                                       1
87              K1      CHANNEL ROUTING USING MODIFIED PULS,4400FT.D/S CHAMBERLAIN,JENNINGSVILLE
88              Y                                       1       1
89              Y1      1
90              Y6 0.030    0.035   0.030  1009.0  1028.0  2200.0    0.005
91              Y7    0.0  1060.0    60.0  1040.0   120.0  1020.0   300.0  1009.0   310.0  1009.0
92              Y7 500.0  1020.0   700.0  1040.0   900.0  1060.0
93              K       0      10                                       1
94              K1      CALCULATION OF SNYDER INFLOW HYDROGRAPH TO JENNINGS POND,(DER 66-12)
95              M       1       1    2.26            7.93                                    1
96              P               21.5    117     127     136     145
97              T                                                       1.0     0.5             0.0253
98              W   1.49    0.62
99              X   -1.5    -0.05     2.0
100             K       2      10                                       1
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COMPUTER INPUT
(Continued)
PAGE D4 OF 18

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101             K1      COMBINED INFLOW HYDROGRAPH TO JENNINGS POND,(DER 86-12)
102             K       1       11                                              1
103             K1      ROUTING FLOW THROUGH JENNINGS POND,(DFR 86-12)
104             Y                                       1       1
105             Y1      1                                                       -1009.0
106             $A    5.0     36.7    83.6    155.2
107             $E1001.0  1009.0  1020.0  1040.0
108             $$1009.0    61.0     3.08     1.5
109             $D1011.4     3.08     1.5   208.0
110             $L   24.0    39.0    80.0    92.0    108.0   190.0   208.0
111             $V1011.4  1011.5  1011.7  1012.0  1012.1  1015.6  1017.6
112             K       99
```

COMPUTER INPUT
(Continued)
PAGE D5 OF 18

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 .10	RATIO 2 .20	RATIO 3 .30	RATIO 4 .40	RATIO 5 .50	RATIO 6 .60	RATIO 7 .70	RATIO 8 .80	RATIO 9 1.00
HYDROGRAPH AT	1	.99	1	301.	603.	904.	1206.	1507.	1808.	2110.	2411.	3014.
	(	2.56)	(	8.53)(	17.07)(	25.60)(	34.14)(	42.67)(	51.21)(	59.74)(	68.28)(	85.35)
ROUTED TO	2	.99	1	121.	432.	764.	1098.	1411.	1720.	2022.	2322.	2918.
	(	2.56)	(	3.42)(	12.22)(	21.63)(	31.09)(	39.95)(	48.70)(	57.26)(	65.75)(	82.64)
ROUTED TO	3	.99	1	107.	247.	816.	1264.	1606.	1752.	2008.	2303.	2920.
	(	2.56)	(	3.02)(	7.00)(	23.10)(	35.78)(	45.49)(	49.62)(	56.87)(	65.21)(	82.69)
HYDROGRAPH AT	4	3.78	1	852.	1703.	2555.	3407.	4259.	5110.	5962.	6814.	8517.
	(	9.79)	(	24.12)(	48.24)(	72.35)(	96.47)(	120.59)(	144.71)(	168.82)(	192.94)(	241.18)
2 COMBINED	4	4.77	1	881.	1890.	3351.	4528.	5562.	6694.	7795.	8910.	11130.
	(	12.35)	(	24.95)(	53.52)(	94.88)(	128.23)(	157.50)(	189.53)(	220.74)(	252.37)(	315.17)
ROUTED TO	5	4.77	1	479.	1293.	2408.	3682.	4894.	6079.	7223.	8360.	10572.
	(	12.35)	(	13.57)(	36.62)(	68.18)(	104.25)(	138.58)(	172.14)(	204.54)(	236.74)(	299.37)
HYDROGRAPH AT	6	.90	1	266.	532.	798.	1064.	1330.	1596.	1863.	2129.	2661.
	(	2.33)	(	7.53)(	15.07)(	22.60)(	30.14)(	37.67)(	45.21)(	52.74)(	60.28)(	75.34)
2 COMBINED	6	5.67	1	531.	1477.	2773.	4298.	5755.	7159.	8525.	9865.	12524.
	(	14.69)	(	15.05)(	41.84)(	78.53)(	121.72)(	162.96)(	202.71)(	241.41)(	279.36)(	354.65)
ROUTED TO	7	5.67	1	459.	1275.	2403.	3764.	5144.	6511.	7863.	9201.	11853.
	(	14.69)	(	13.00)(	36.11)(	68.05)(	106.58)(	145.67)(	184.38)(	222.65)(	260.55)(	335.63)
ROUTED TO	8	5.67	1	459.	1275.	2399.	3766.	5138.	6506.	7848.	9205.	11849.
	(	14.69)	(	12.99)(	36.09)(	67.94)(	106.64)(	145.48)(	184.22)(	222.24)(	260.65)(	335.52)
ROUTED TO	9	5.67	1	458.	1274.	2399.	3761.	5133.	6495.	7856.	9198.	11827.
	(	14.69)	(	12.98)(	36.06)(	67.93)(	106.49)(	145.36)(	183.92)(	222.44)(	260.47)(	334.92)
HYDROGRAPH AT	10	2.26	1	617.	1235.	1852.	2470.	3087.	3705.	4322.	4939.	6174.
	(	5.85)	(	17.48)(	34.97)(	52.45)(	69.93)(	87.42)(	104.90)(	122.38)(	139.87)(	174.84)
2 COMBINED	10	7.93	1	725.	1647.	3060.	4929.	6835.	8735.	10616.	12496.	16192.
	(	20.54)	(	20.52)(	46.64)(	86.66)(	139.57)(	193.56)(	247.34)(	300.62)(	353.92)(	458.52)
ROUTED TO	11	7.93	1	606.	1617.	3003.	4813.	6678.	8554.	10430.	12301.	15973.
	(	20.54)	(	17.15)(	45.78)(	85.03)(	136.30)(	189.10)(	242.22)(	295.34)(	347.77)(	451.19)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1135.00	1135.00	1136.10
STORAGE	0.	0.	51.
OUTFLOW	0.	0.	35.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	1136.42	.32	66.	121.	6.60	43.00	0.00
.20	1136.88	.78	89.	432.	9.40	41.80	0.00
.30	1137.19	1.09	104.	764.	10.80	41.40	0.00
.40	1137.40	1.30	114.	1098.	12.00	41.20	0.00
.50	1137.56	1.46	122.	1411.	12.80	41.00	0.00
.60	1137.71	1.61	130.	1720.	13.40	41.00	0.00
.70	1137.84	1.74	136.	2022.	14.00	41.00	0.00
.80	1137.96	1.86	143.	2322.	14.60	41.00	0.00
1.00	1138.19	2.09	154.	2918.	15.40	41.00	0.00

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1100.00	1100.00	1120.00
STORAGE	0.	0.	50.
OUTFLOW	0.	0.	259.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	1105.53	0.00	7.	107.	0.00	43.80	.00
.20	1118.51	0.00	44.	247.	0.00	43.80	.00
.30	1120.65	.65	53.	816.	3.00	41.80	.00
.40	1120.96	.96	55.	1264.	3.80	41.20	.00
.50	1121.17	1.17	56.	1606.	4.60	40.80	.00
.60	1121.25	1.25	56.	1752.	5.00	41.00	.00
.70	1121.39	1.39	57.	2008.	5.40	41.00	.00
.80	1121.55	1.55	58.	2323.	5.80	41.00	.00
1.00	1121.84	1.84	60.	2920.	6.40	41.00	.00

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1065.60	1065.60	1065.70
STORAGE	297.	297.	305.
OUTFLOW	0.	0.	0.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	1066.10	2.60	512.	679.	22.20	44.60	0.00
.20	1067.53	3.83	647.	1293.	23.00	43.60	0.00
.30	1068.69	4.99	765.	2408.	25.20	43.00	0.00
.40	1069.40	5.70	839.	3682.	30.40	42.80	0.00
.50	1069.95	6.25	899.	4894.	37.80	42.60	0.00
.60	1070.42	6.72	952.	6079.	40.40	42.20	0.00
.70	1070.85	7.15	1000.	7223.	41.20	42.00	0.00
.80	1071.25	7.55	1046.	8360.	41.80	42.00	0.00
1.00	1071.97	8.27	1130.	10572.	42.40	42.00	0.00

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1055.00	1055.00	1066.70
STORAGE	557.	557.	5061.
OUTFLOW	0.	0.	1559.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	1056.79	0.09	650.	659.	0.00	45.50	0.
.20	1058.55	0.03	551.	1275.	0.00	44.00	0.
.30	1060.11	1.61	652.	2455.	5.00	43.00	0.
.40	1061.47	2.77	765.	3726.	6.60	43.00	0.
.50	1062.61	3.91	865.	5164.	7.40	43.00	0.
.60	1063.59	4.89	897.	6511.	8.20	42.80	0.
.70	1064.47	5.77	961.	7863.	8.60	42.60	0.
.80	1065.27	6.57	1021.	9201.	9.20	42.60	0.
1.00	1066.70	8.00	1132.	11853.	9.80	42.60	0.

PLAN 1 STATION 8

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	459.	1022.4	45.60
.20	1275.	1023.8	44.60
.30	2349.	1024.9	43.80
.40	3766.	1025.9	43.40
.50	5138.	1026.7	43.00
.60	6506.	1027.3	42.80
.70	7848.	1027.9	42.80
.80	9205.	1028.4	42.60
1.00	11849.	1029.3	42.40

PLAN 1 STATION 9

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.10	458.	1011.4	45.60
.20	1274.	1012.7	44.80
.30	2399.	1013.7	44.00
.40	3761.	1014.7	43.40
.50	5133.	1015.4	43.20
.60	6495.	1016.1	43.00
.70	7856.	1016.6	42.80
.80	9198.	1017.1	42.60
1.00	11827.	1017.9	42.40

SUMMARY OF DAM SAFETY ANALYSIS

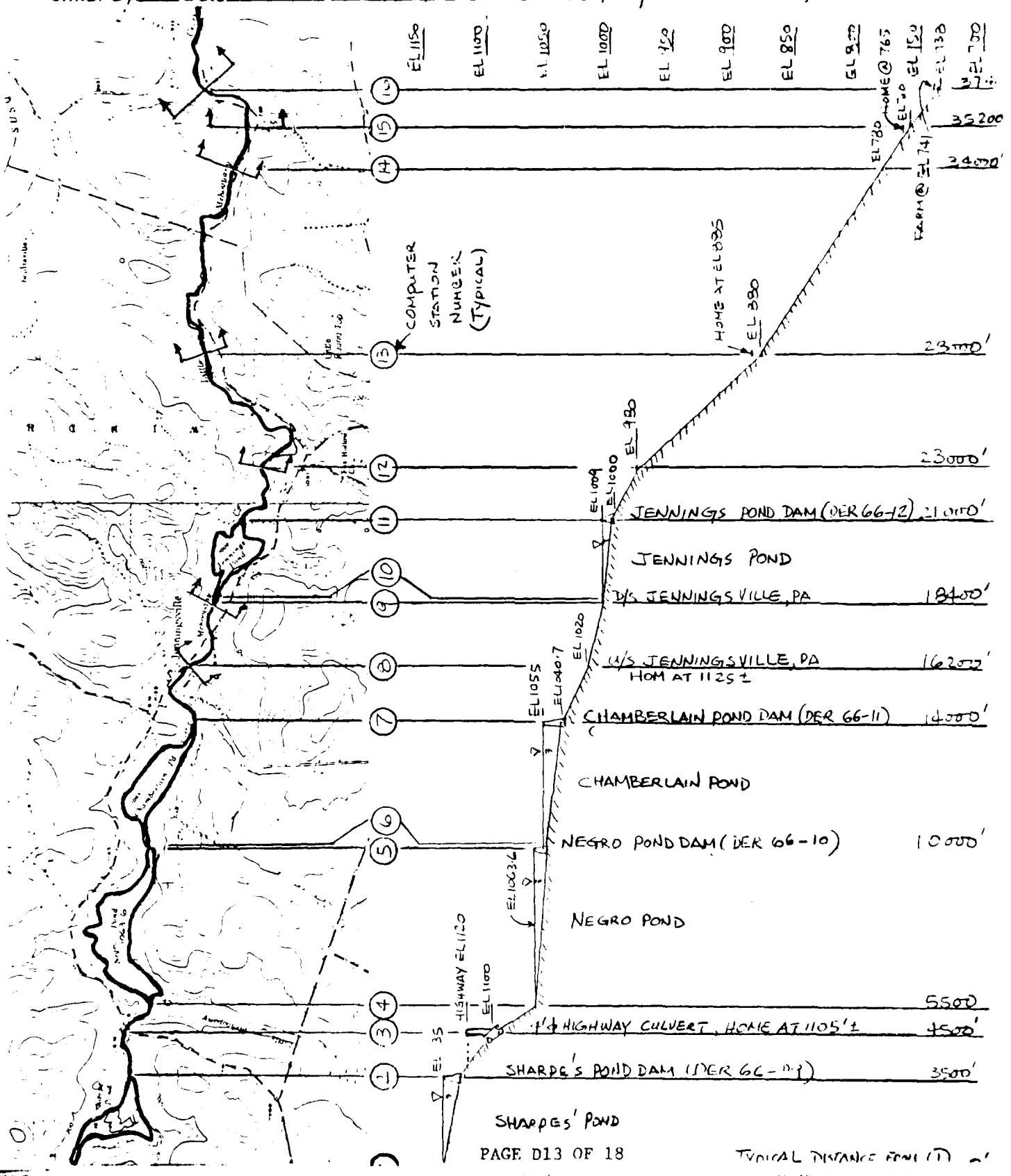
PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1009.00	1009.00	1011.40
STORAGE	147.	147.	246.
OUTFLOW	0.	0.	699.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.10	1011.18	0.00	236.	606.	0.00	43.40	0.00
.20	1012.60	1.20	305.	1617.	9.60	43.60	0.00
.30	1013.70	2.30	360.	3003.	11.40	43.80	0.00
.40	1014.79	3.39	422.	4813.	12.40	43.40	0.00
.50	1015.71	4.31	478.	6678.	13.40	43.20	0.00
.60	1016.50	5.10	529.	8554.	14.20	43.00	0.00
.70	1017.22	5.82	578.	10430.	14.60	42.80	0.00
.80	1017.87	6.47	625.	12281.	15.20	42.60	0.00
1.00	1019.05	7.65	714.	15933.	15.80	42.40	0.00

DRAPPO DILONIA
CONSULTING ENGINEERS INC

By WTC Date 11-6-81 Subject HYDROLOGY & HYDRAULIC CALC. Sheet No 1 of 6
Chkd. By WV Date 12/2/81 PLAN & PROFILE OF LITTLE MEHOOPANY CREEK Proj. No 80-556



DOWNSTREAM SECTIONS (LOOKING D/S)

STATION 1 SHARPE'S POND LAKE EL 1125 (See SHEET 5 OF 6 FOR CAPACITY)

STATION 2 SHARPE'S POND DAM (DER 66-09)

STATION 3 4'ϕ CULVERT, HOME BASEMENT @EL 1105± (See SHEET 6 OF 6 FOR CAPACITY)

STATION 4 NEGRO POND

STATION 5 NEGRO POND DAM (DER 66-10)

STATION 6 CHAMBERLAIN POND

STATION 7 CHAMERLAIN POND DAM (DER 66-11)

SECTION 8 U/S JENNINGSVILLE CHANNEL SECTION

DISTANCE, FT	ELEVATION	
0	1080	
200	1060	n=0.030
450	1040	
710	1020	n=0.04
720	1020	
950	1040	n=0.035
1100	1060	
1200	1080	

L = 2200 FT

$S = \frac{1040.7 - 1020}{2200}$

$= 0.00941$

SECTION 9 D/S JENNINGSVILLE CHANNEL SECTION

DISTANCE, FT	ELEVATION	
0	1060	
60	1040	n=0.030
120	1020	
300	1009	n=0.035
310	1009	
500	1020	
700	1040	n=0.030
900	1060	

L = 2200 FT

$S = \frac{1020 - 1009}{2200}$

$= 0.0050$

STATION 10 JENNINGS POND

STATION 11 JENNINGS POND DAM (DER 66-12)

STATION 12 2000' D/S FROM JENNINGS POND

DISTANCE, FT	ELEVATION	
0	1040	
100	1020	n = 0.035
300	1000	
400	980	n = 0.035
410	980	
700	1000	
880	1020	n = 0.035
1000	1040	

$L = 2000'$ FT

$S = \frac{1000 - 980}{2000}$

$= 0.010$

STATION 13 7000' D/S FROM JENNINGS POND HOME @ EL 885

DISTANCE, FT	ELEVATION	
0	940	
50	920	n = 0.035
150	900	
220	880	n = 0.035
230	880	
380	900	
420	920	n = 0.035
450	940	

$L = 5000$ FT

$S = \frac{980 - 880}{5000}$

$= 0.020$

STATION 14 13000' D/S FROM JENNINGS POND

DISTANCE, FT	ELEVATION	
0	840	
50	820	n = 0.035
100	800	
200	780	n = 0.035
210	780	
350	800	
430	820	n = 0.035
500	840	

$L = 6000$ FT

$S = \frac{780 - 780}{6000}$

$= 0.016667$

STATION 15 14200 FT D/S FROM JENNINGS POND, HOME AT ELEV. 765

DISTANCE, FT	ELEVATION	
0	820	
50	800	n=0.035
100	780	
350	760	n=0.035
360	760	
650	780	
700	800	n=0.035
800	820	

L = 1200 FT

$S = \frac{780-760}{1200}$

$= 0.016667$

STATION 16 16,400 FT D/S FROM JENNINGS POND, FARM AT ELEV. 72

DISTANCE FT	ELEVATION	
0	780	
100	760	n=0.035
500	740	
510	738	n=0.035
520	738	
550	740	
600	760	n=0.035
700	780	

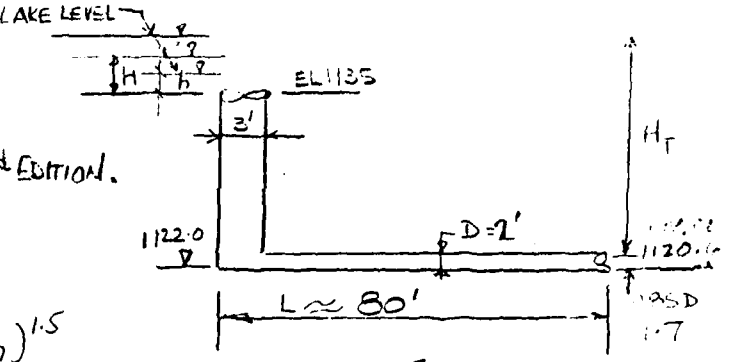
L = 2200 FT

$S = \frac{760-738}{2200}$

$= 0.010$

NOTES (1)

SPILLWAY DISCHARGE CAPACITY



REFERENCE DESIGN OF SMALL DAM 2nd EDITION.

FOR WEIR FLOW CONTROL

$$Q_W = C L h^{1.5} = (3.2)(\pi)(3)(h)^{1.5}$$
$$= 30.16\, h^{1.5} = 30.16\,(\text{LAKE ELEV} - 1135)^{1.5} \quad -(\text{EQ 1})$$

FOR ORIFICE FLOW CONTROL

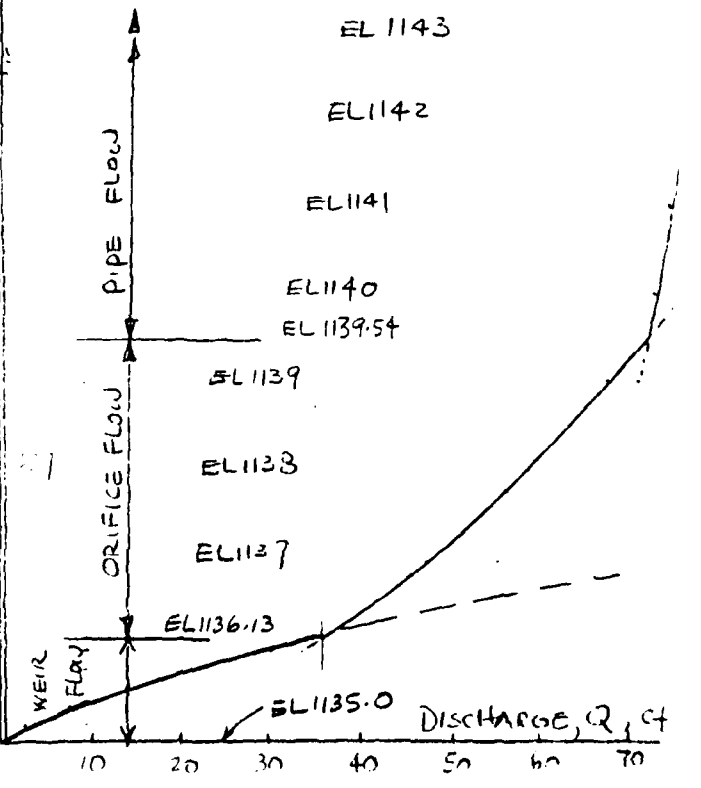
$$Q_O = C_o A \sqrt{2gH} = (0.6)\left(\frac{\pi 3^2}{4}\right)(64.4)^{1/2}\sqrt{H} = 34.04\sqrt{H} = 34.04\sqrt{\text{LAKE EL} - 1}$$
(EQ. 2)

FOR PIPE FLOW CONTROL

$$H_T = \left[\frac{2.5204(1+K_e)}{D^4} + \frac{466.18\, n^2 L}{D^{16/3}}\right]\left(\frac{Q_p}{10}\right)^2 = \left[\frac{25204(1.5)}{(2)^4} + \frac{(466.18)(.013)^2(30)}{(2)^{16/3}}\right]\left(\frac{Q_p}{10}\right)^2$$

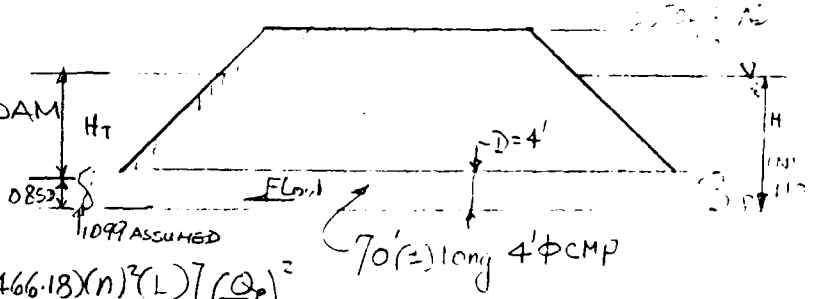
$$Q_p = 15.96\sqrt{H_T} = 15.96\sqrt{\text{LAKE EL.} - 1120.6 - .85(2)} = 15.96\sqrt{\text{LAKE EL} - 1118.9}$$ (EQ.

LAKE ELEVATION	Q_W cfs	Q_O cfs	Q_P cfs	SPILLWAY CAPACITY Q, cfs
1135.0	0	0	0	0
1135.2	2.7			2.7
1135.4	7.6			7.6
1135.6	14.0			14.0
1135.8	21.6			21.6
1136.0	30.2	34.0		30.2
1136.13	36.2	36.2		36.2
1137.0	85.3	48.1		48.1
1138.0		59.0		59.0
1139.0		68.1	71.6	68.1
→ 1139.54		72.5	72.5	72.5
1140.0		76.1	73.3	73.3
1141.0			75.0	75.0
1142.0			76.7	76.7
1143.0			78.3	78.3



ROAD CULVERT CAPACITY

REFERENCE : DESIGN OF SMALL DAM
2nd EDITION



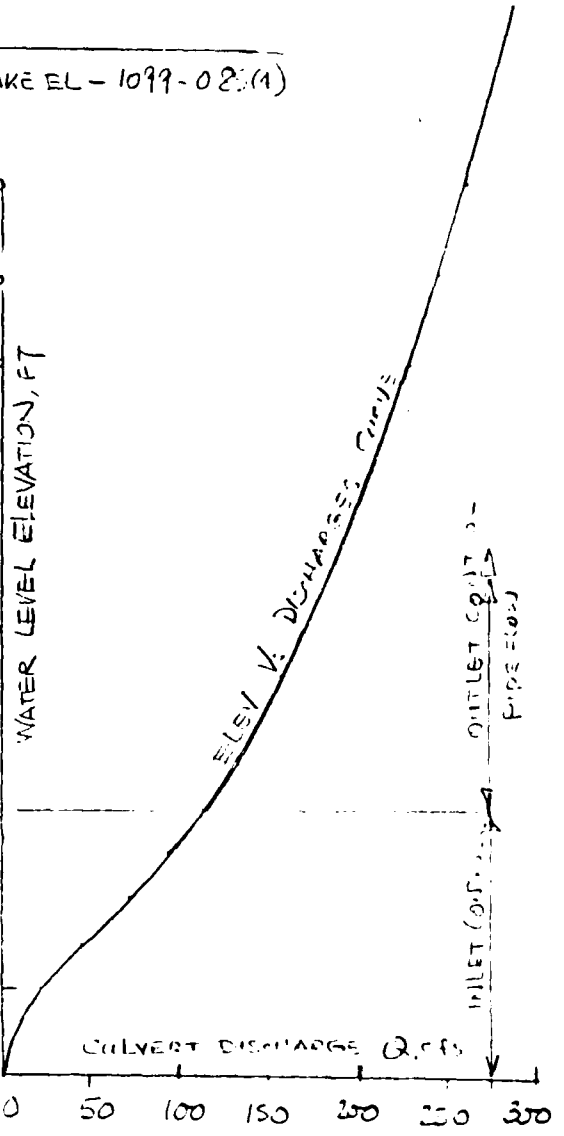
FOR PIPE FLOW CONTROL

$$H_T = \left[\frac{(2.5204)(1+K_e)}{D^4} + \frac{(466.18)(n)^2(L)}{D^{16/3}}\right]\left(\frac{Q_p}{10}\right)^2$$

$$= \left[\frac{(25204)(1.5)}{(4)^4} + \frac{(466.18)(0.024)^2(70)}{(4)^{16/3}}\right]\left(\frac{Q_p}{10}\right)^2$$

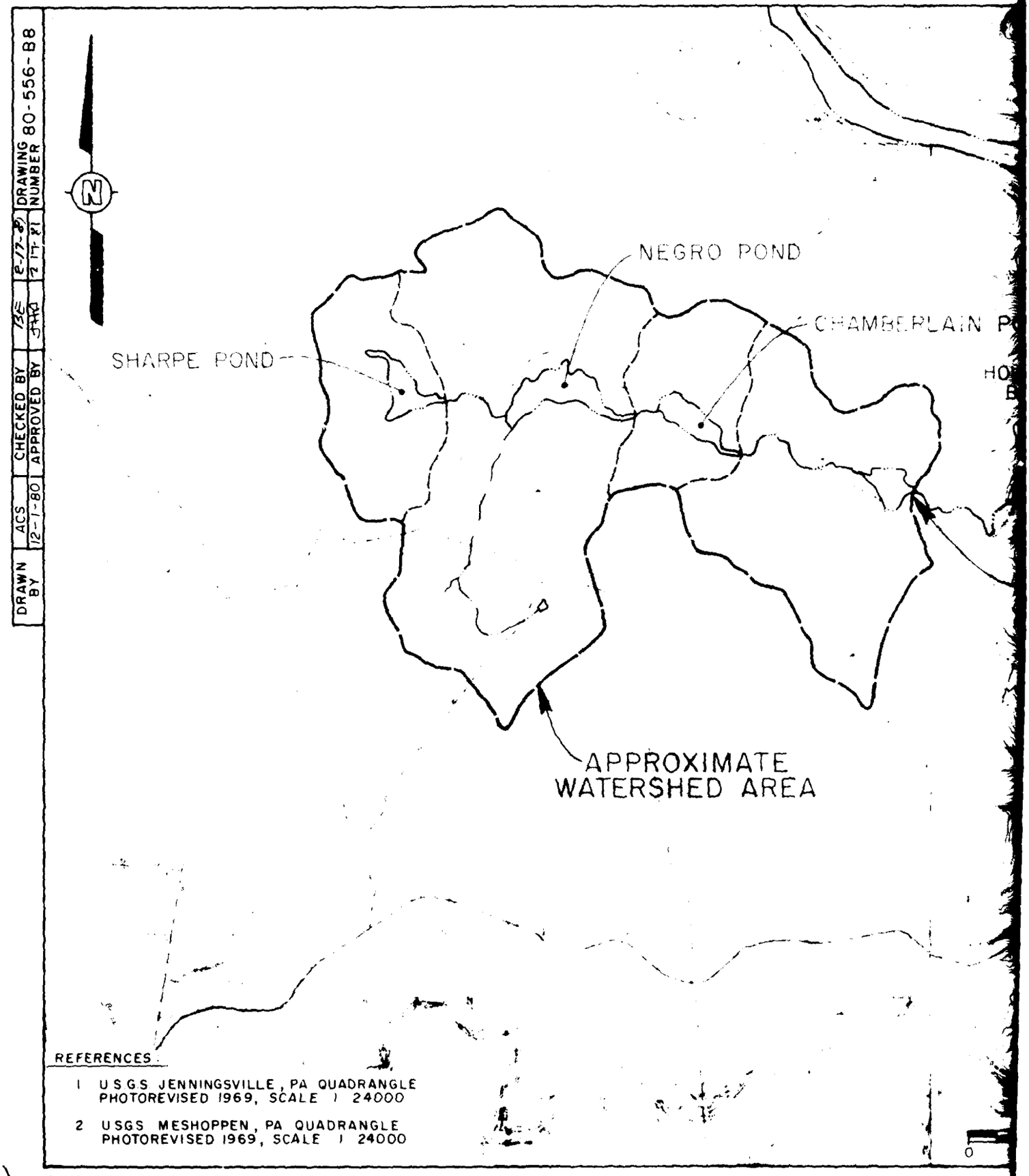
$$Q_p = 61.63\sqrt{H_T} = 61.63\sqrt{\text{LAKE EL} - 1099 - 0.85(4)}$$
$$= 61.63\sqrt{\text{LAKE EL} - 1102.4}$$

LAKE ELEVATION (FT)	FIG. 8-9 P366 of REFERENCE INLET CONTROL H (FT)	H/D	Q_i cfs	OUTLET CONTROL Q_p cfs	CULVERT CAPACITY Q cfs
1100	0	0	0	0	0
1102	2	0.5	23		23
1103	3	0.75	46		46
1104	4	1.00	72	78	72
1105	5	1.25	95	99	95
1106	6	1.5	117	117	117
1107	7	1.75	133	132	132
1108	8	2.0	150	146	146
1109	9			158	158
1110	10			170	170
1112	12			191	191
1114	14			210	210
1116	16			227	227
1118	18			243	243
1120	20			259	259
1122	22			273	273
1124	24			286	286



APPENDIX E

PLATES



19 1293 HERCULENE ARB SMITH CO PGH PA LT1530-1079

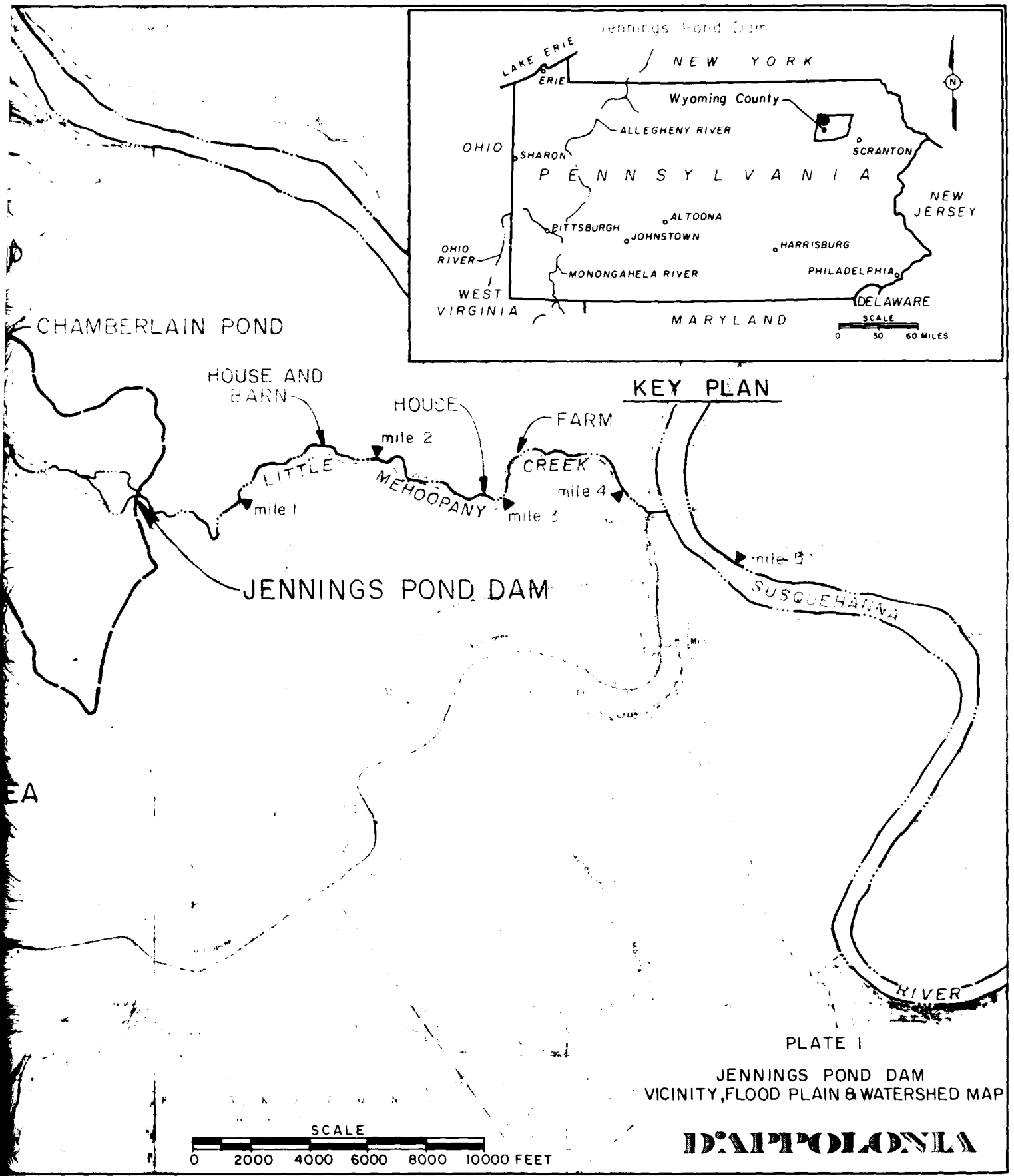
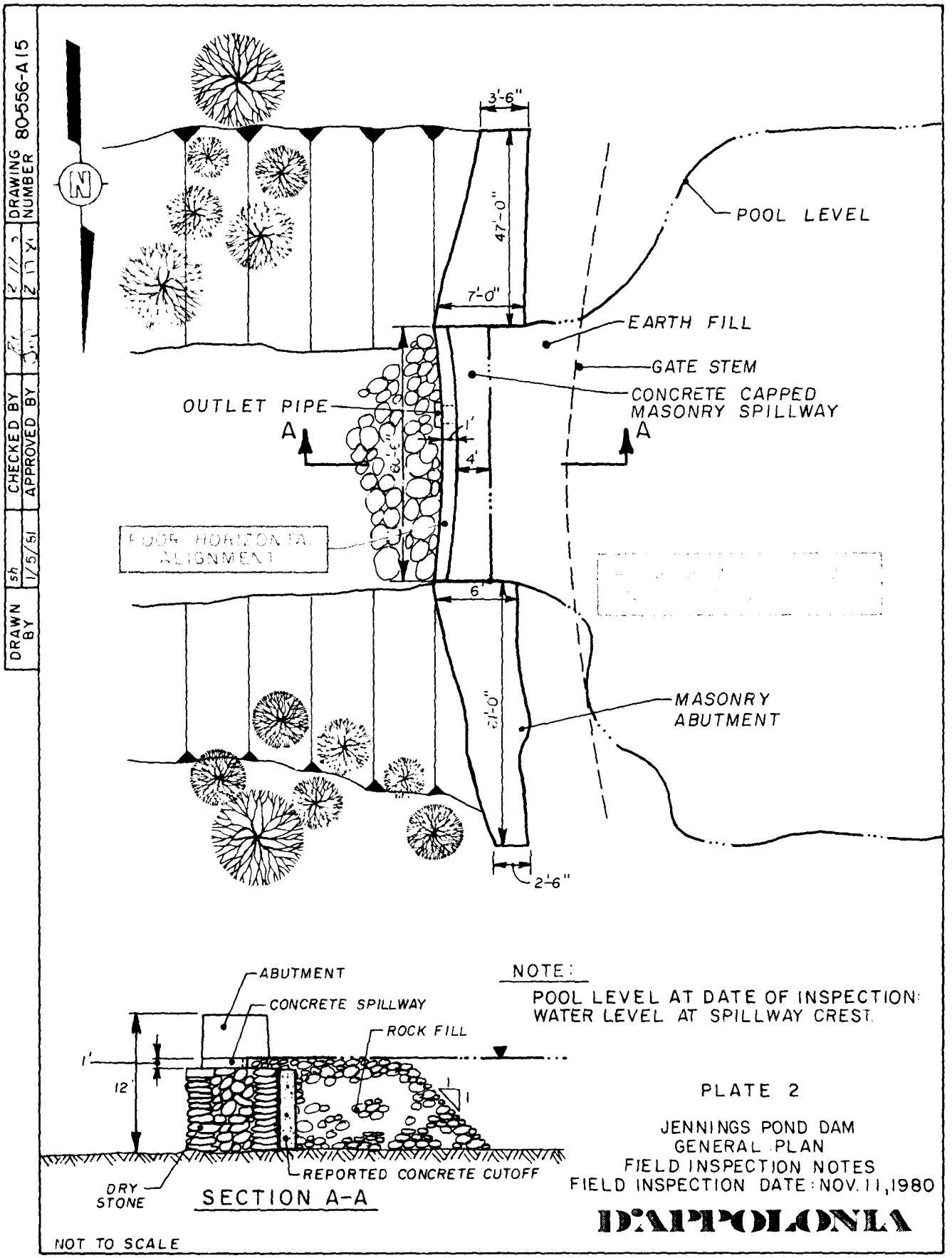


PLATE 1

JENNINGS POND DAM
VICINITY, FLOOD PLAIN & WATERSHED MAP

DAPPOLONIA



19 1253 HERCULENE AAB SMITH CO PGH PA LT1530-1079

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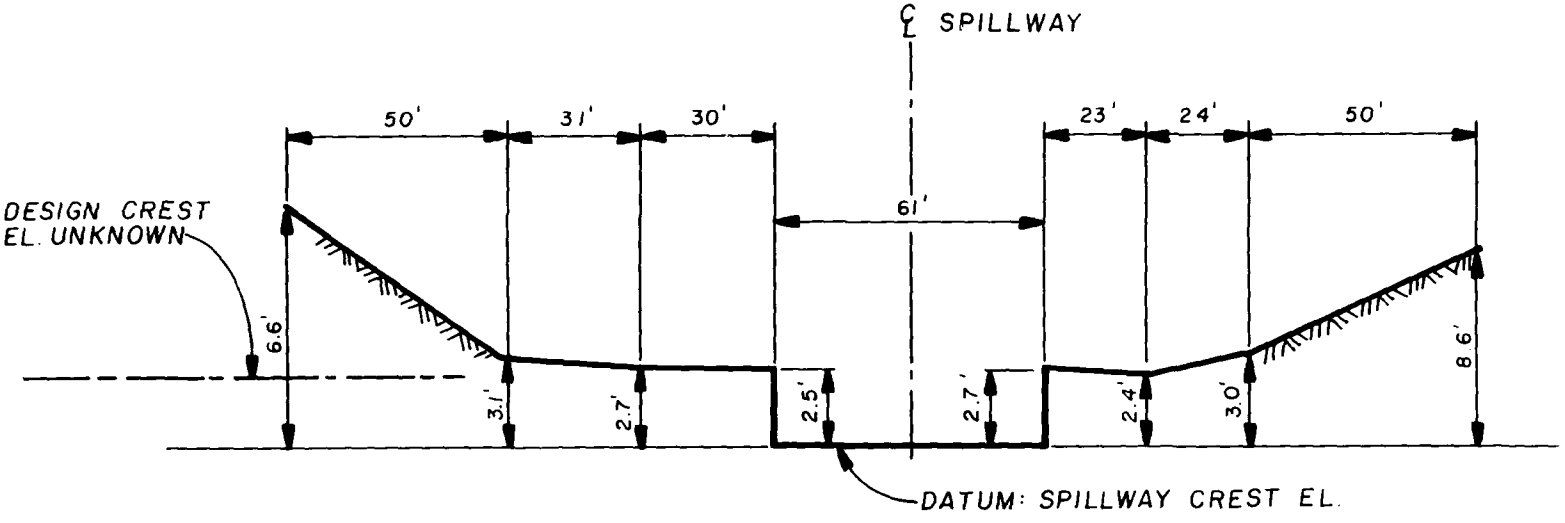
19 1253 HERCULENE ABB SMITH CO PGH PA LT11530-1078



DAM CREST PROFILE

(LOOKING DOWNSTREAM)

NOTES:

1. DAM CREST WAS SURVEYED RELATIVE TO SPILLWAY CREST.
2. DATUM ELEVATION PER USGS MAPS

PLATE 3

JENNINGS POND
DAM CREST SURVEY
FIELD INSPECTION DATE NOV. 11, 1980

DAMTECHNA

APPENDIX F

REGIONAL GEOLOGY

REGIONAL GEOLOGY
NEGRO POND, SHARPE'S POND, CHAMBERLAIN POND AND JENNINGS POND DAMS

The Negro Pond, Sharpe's Pond, Chamberlain Pond, and Jennings Pond dams are located in the glaciated low plateaus section of the Appalachian Plateau physiographic province, characterized as a mature glaciated plateau of moderate relief.

The geologic structure consists of a series of northeast trending folds (approximately N70°E) which plunge gently to the southwest. The dip of the limbs of the folds in the vicinity of the dams is less than five degrees, with the southeast limb steeper than the northwest limb. The dams are located south of the Wilmot Anticline. In general, the discontinuity trends are northeast and northwest.

The stratigraphy consists of glacial till which will range in thickness from very thin to approximately 200 feet. The glacial till is underlain by the Devonian Chemung Formation, which is approximately 475 feet thick in this area. The Chemung Formation is marine in origin, consisting of green-gray sandstone, multicolored shale, and sandy shale. The shale strata tend to weather rapidly when exposed.

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	1-2-81	APPROVED BY	2-17-81	

SCALE

0 2 4 6 8 10 miles

GEOLOGY MAP

REFERENCE

GEOLOGIC MAP OF PENNSYLVANIA PREPARED BY COMMONWEALTH OF PENNA. DEPARTMENT OF ENVIRONMENTAL RESOURCES DATED 1960
SCALE : 250,000

DAPPOLONIA

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PENNSYLVANIAN

APPALACHIAN PLATEAU

Ps — Allegheny Group

Pp — Pottsville Group

ANTHRACITE REGION

Pa

MISSISSIPPIAN

Mmc — Mauch Chunk Formation

Mp — Pocono Group

DEVONIAN

UPPER

CENTRAL AND EASTERN PENNSYLVANIA

Dos — Oswayo Formation

Dck — Catskill Formation

Marcellus

Ds — Susquehanna Group

GEOLOGY MAP LEGEND

REFERENCE

GEOLOGIC MAP OF PENNSYLVANIA PREPARED BY COMMONWEALTH OF PENNA, DEPARTMENT OF ENVIRONMENTAL RESOURCES, DATED 1960
SCALE : 250,000

D'APPOLONIA

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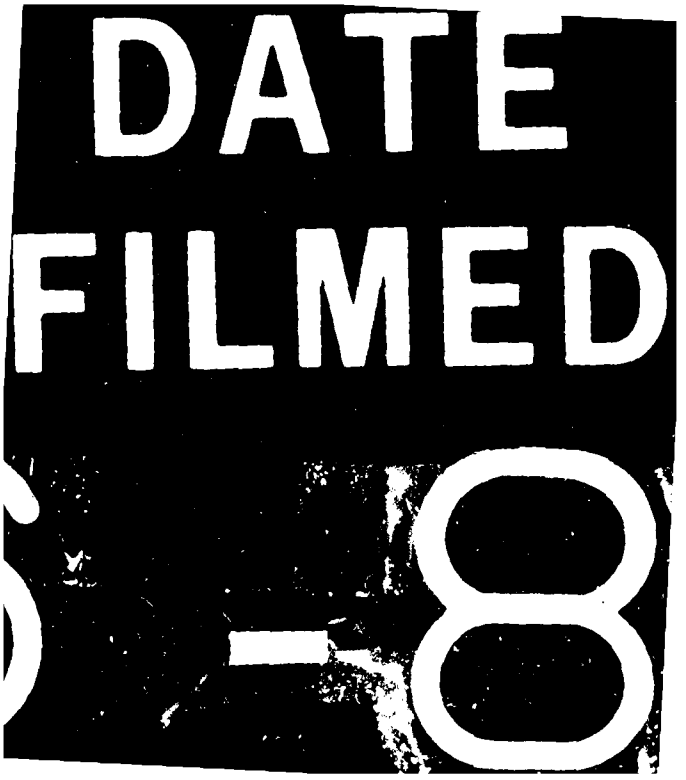
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